



Test

# Vehicle-Tank Meters

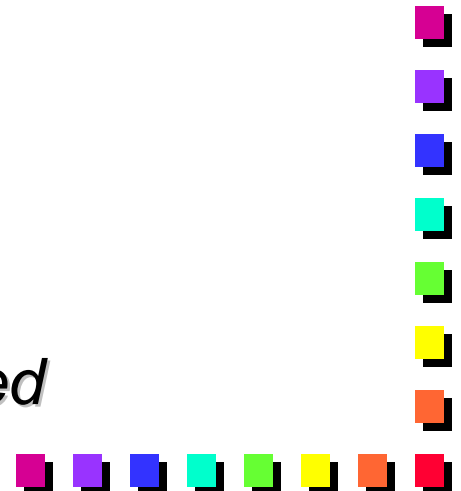
## NIST Short Course



# Testing - Overview

- Normal Test\*
- Slow-Flow Test\*
- Split Compartment Test\*
- RFI/EMI Test
- Automatic (Preset) Stop Test
- Antidrain Valve Test
- Review of Test Results

*\* Tests at or close to tolerances are repeated*



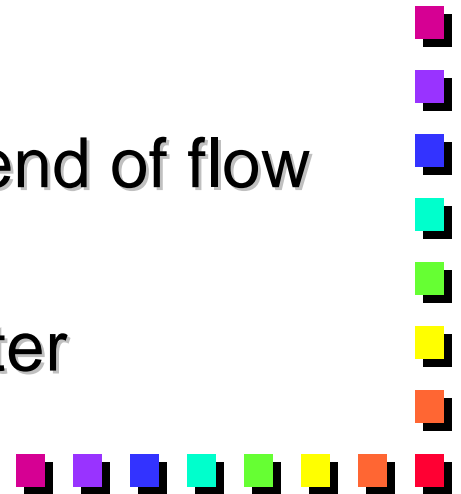
# Normal Test

- also known as “fast test”
- run at full flow with nozzle wide open
  - verify flow rate does not exceed marked maximum
- basic tolerances apply
- assesses meter performance under normal conditions



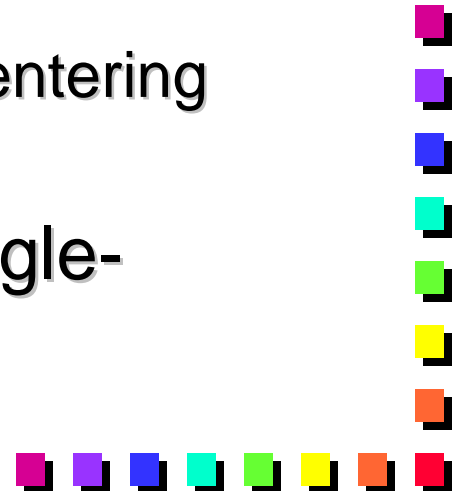
# Special Test - Slow Flow

- slow flow run just above minimum flow rate marked on meter or 20% of max, whichever is lower
- special test tolerances apply
- meter must be accurate at all points over rated flow range
  - slow flow verifies accuracy at low end of flow rate range
  - verifies proper maintenance of meter



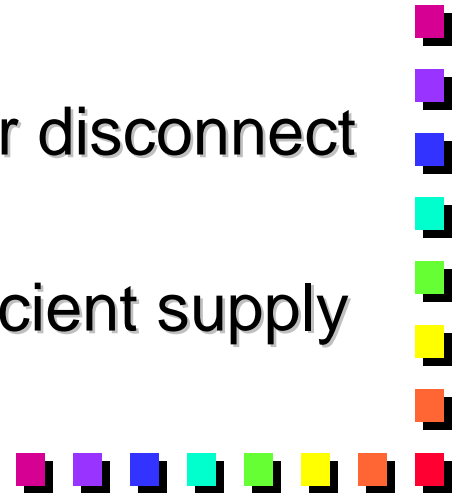
# Special Test - Vapor Elimination

- “Split Compartment” Test - Special Test
  - designed to verify operation of air eliminator
    - PD meter cannot distinguish between air and product
    - vapor eliminator prevents air from entering meter
  - performed on both multi- and single-compartment vehicles



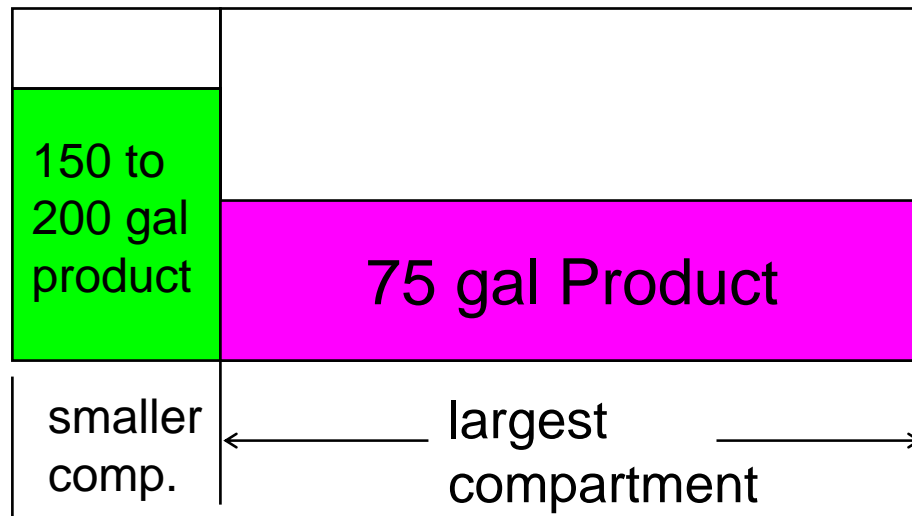
# Vapor Elimination (cont.)

- 1) start from a compartment containing less product than one-half capacity of prover
  - recommend starting test from largest compartment
  - If starting with dry compartment, circulate some product through system first.
- 2) run product until lack of fluid causes meter register to stop
- 3) with pump in operation, shut manifold or disconnect whip hose connection
- 4) open valve from compartment with sufficient supply of product to complete test

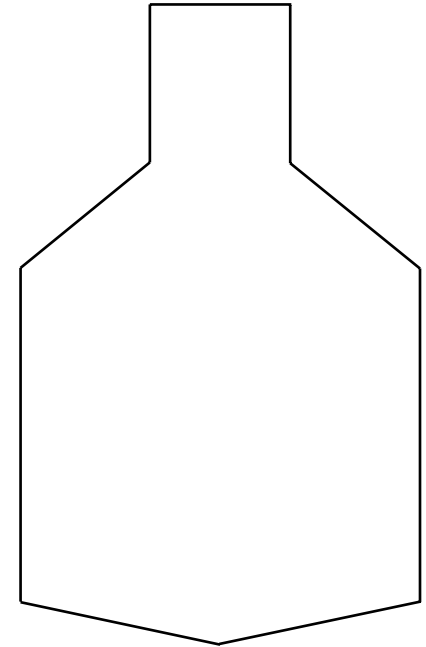


# Set-up for Split Compartment Test

1. Start with a quantity of product equal to less than 1/2 prover capacity in largest compartment. Put enough product to finish filling prover in other compartment.



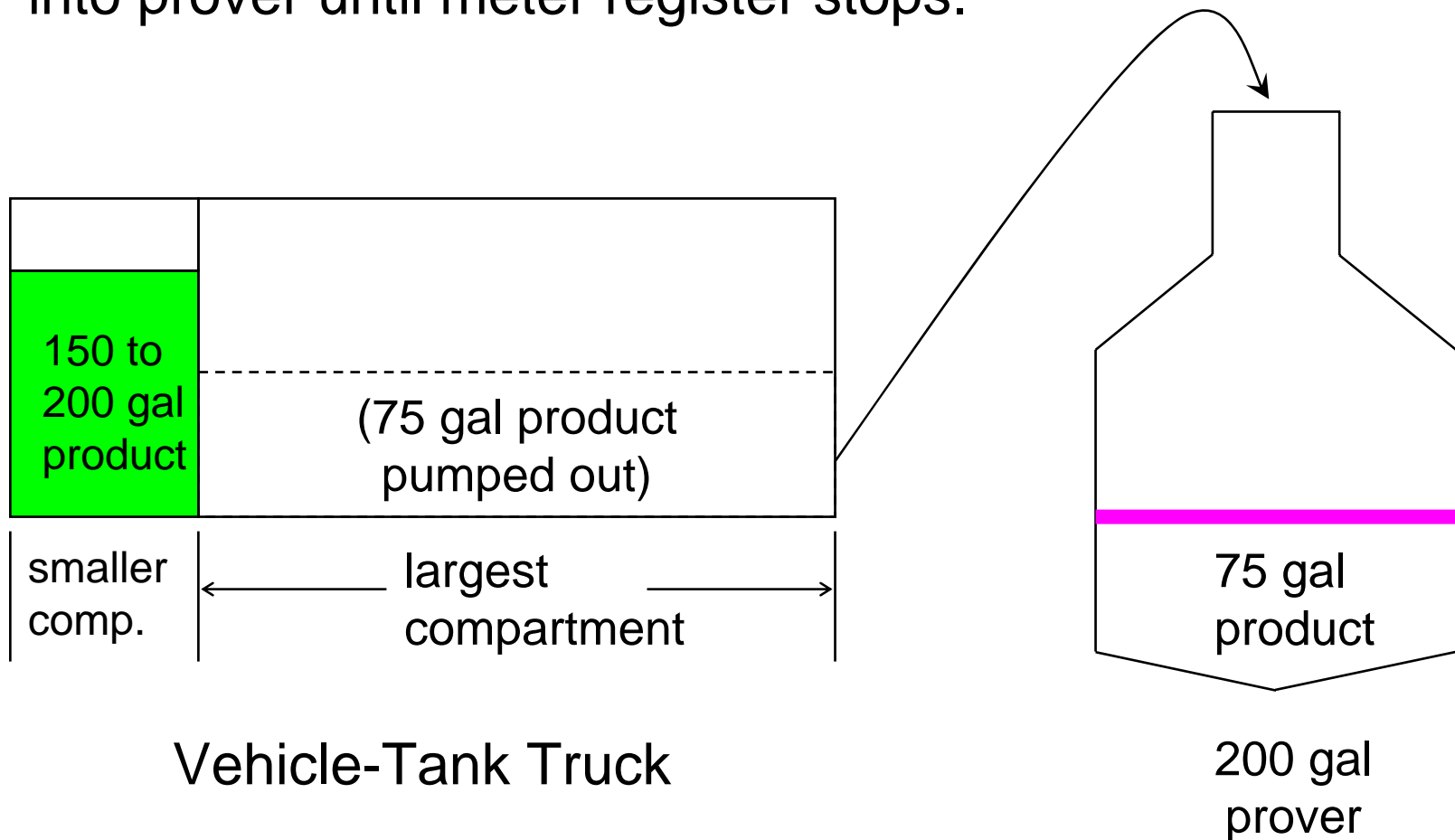
Vehicle-Tank Truck



200 gal  
prover

# Set-up for Split Compartment Test

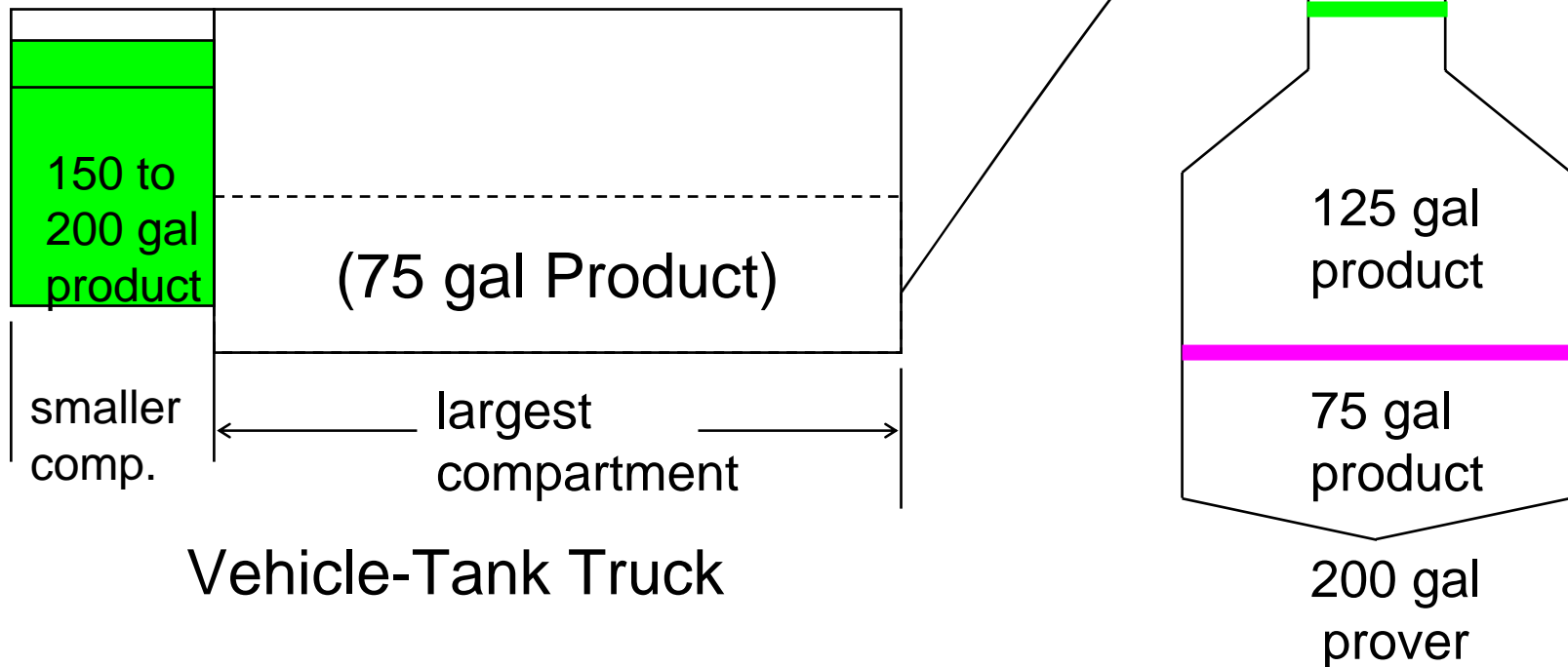
2. Pump product out of largest compartment into prover until meter register stops.





# Set-up for Split Compartment Test

3. When meter register stops, have operator shut manifold valve to large compartment & open manifold valve to compartment with product. Pump product into prover until meter indication reaches prover capacity. Disengage pump & read prover.



# Vapor Elimination Test on Single Compartment Vehicle

- test is run the same as for multi-compartment vehicle except:
- pump is disengaged after fluid causes meter to stop
  - duplicates what would happen in actual use
  - prevents entrained air from splashing product from being drawn into meter
- product is added to empty tank
- pump is engaged again & delivery continued to completion



# RFI/EMI Testing

- performed with equipment normally present in environment
  - verifies equipment protected against effects of RFI/EMI
- some jurisdictions have specific procedures
- Scale Manufacturers Association (SMA) developed RFI test procedure in 1970's
  - under revision
  - developed for scales, but can be used as guideline



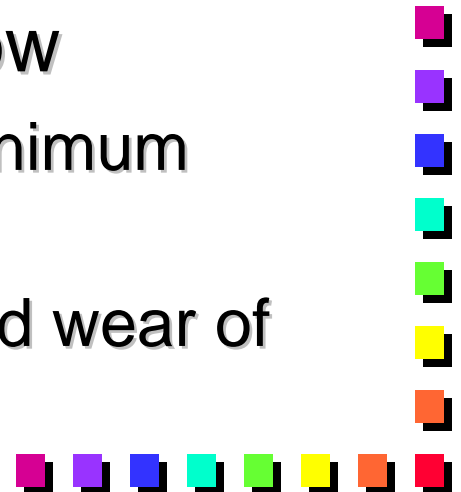
# Automatic Stop Mechanism Test

1) set pre-set mechanism for pre-determined quantity

- not necessary to pump to capacity of prover
- pre-set quantity for at least 30 gallons

2) pump product into prover at full flow

- ensure smooth shut off within 1/2 minimum increment
- abrupt shut off can cause accelerated wear of metering system



# Anti-Drain Valve Test

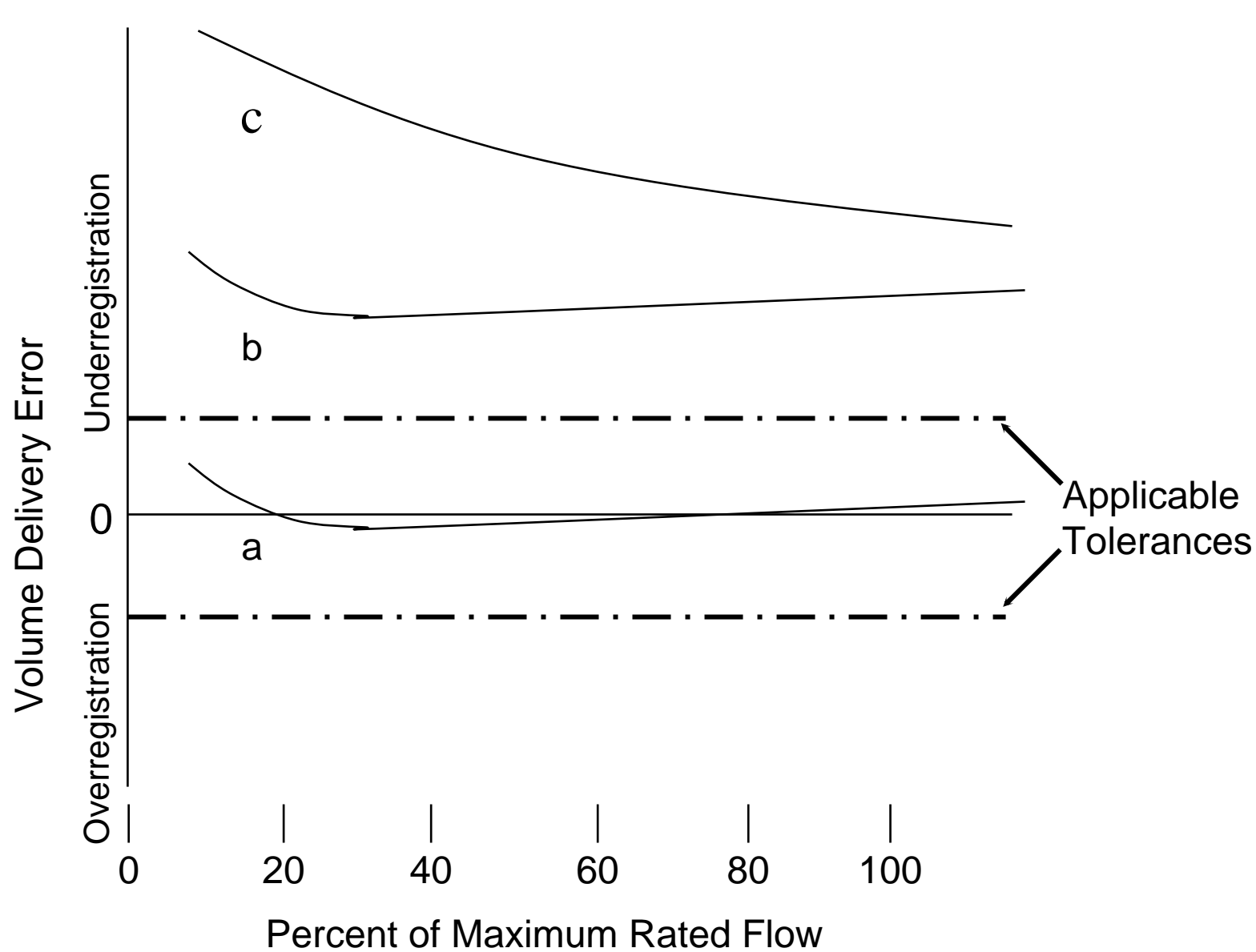
- 1) at conclusion of last accuracy test, disengage pump from vehicle engine
- 2) raise length of discharge hose above meter level
- 3) open delivery hose valve over container
- 4) small amount of product will flow out
  - flow should diminish and cease after about 30 seconds
  - if flow continues, anti-drain is malfunctioning



# Reviewing Test Results

- Why run a slow test? Split-compartment test?
- tests designed to examine characteristics of metering system
  - are metering system being properly maintained
    - includes components such as air eliminator
  - are adjustments being used properly
    - are adjustments made to bring device as close to zero error as possible
- difference between results for tests at maximum and minimum flow rates provides general indication of condition of meter





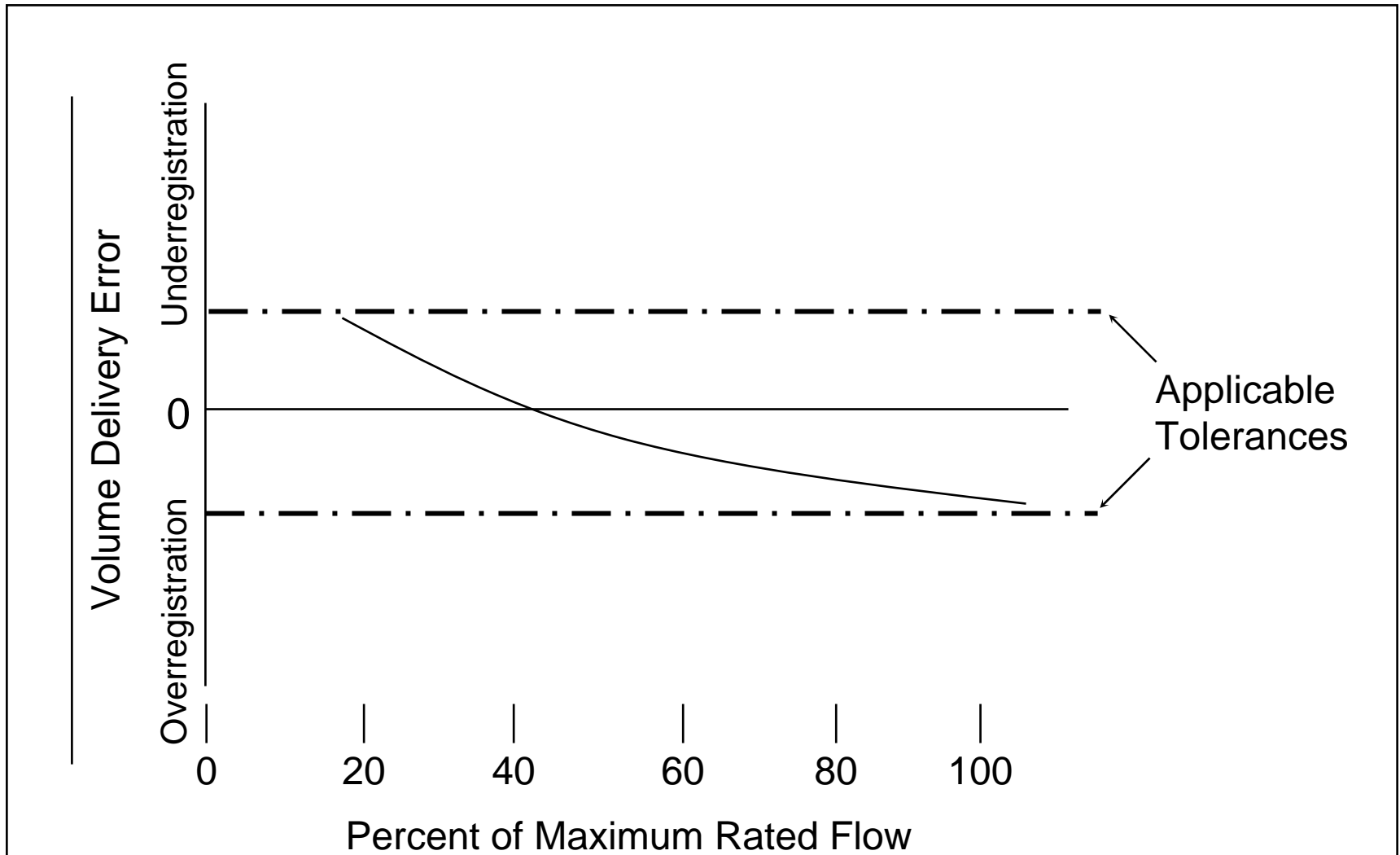
# Reviewing Test Results

- curve “a” is a new or recently adjusted meter
- curve “b” is a meter that is out of tolerance, but that can be adjusted to bring entire curve into tolerance band
- curve “c” is a badly worn meter
  - simply readjusting will not correct
  - readjusting meter **may** bring the meter within tolerance, but.....remember G-UR.4.1.
    - equipment shall be continuously maintained in proper operating condition
    - equipment in service at a single place of business found to be in error predominantly in a direction favorable to the device user shall not be considered “maintained in a proper operating condition”





# Curve “c” Inside Tolerance Band -- Badly Worn Meter



# Completing Test

- review test results
- disconnect prover
- record ending totalizer readings and total quantity dispensed during test
- secure meter and prover
  - apply appropriate seals to meter
- proceed to “Post-Test Tasks”
  - assess official action required
  - review results with owner
    - explain test results, but don't troubleshoot

